

Application Serial No.: 10/655,143
Reply to Office Action of August 21, 2007

Atty. Dkt. No.
UCF-375

REMARKS/ARGUMENTS

Favorable consideration of the above claims is respectfully requested.

Claims 2, 23-27 were pending prior to this amendment. In the present amendment, Applicants have canceled claims 2, 23-26, amended independent claim 27 to incorporate inventive features of the present invention and added new claims 28 – 33 for consideration. Specially engineered particles of cerium oxide enhance the longevity and increase the survivability of living biological cells by acting as a regenerative free radical scavenger that are in contact with living biological cells in the body and are biologically available for multiple rounds of free-radical scavenging. Support for the amendments to Claim 27 is found in the specification on page 2, lines 4-7; Fig. 3; page 4, lines 18-24; page 5, lines 1-10, 13-15; page 6, lines 6 – 9, 13, 18-19 and page 7, lines 18-22.

No new matter is added by the amendments identified above.

Applicants now respond to the detailed action starting with a statement of Applicants' invention, as now claimed: Applicants disclose a novel method for increasing the life-span and survivability of living cells by contacting non-agglomerated, ultra-fine, engineered nanoparticles of cerium oxide, with high biological activity as free radical scavengers, to cultures of aging and injured living cells. The structure and mixed valence states of the cerium oxide particles permits regeneration of the particles once a radical scavenging event has occurred, making them biologically available for multiple rounds of radical scavenging. Prior to Applicants' invention, it was not known that cerium oxide particles were regenerative free radical scavengers capable of multiple rounds of radical scavenging in the body to increase the survivability of aging and injured cells.

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Claim Rejections – 35 USC § 103 – On pages 2-3 of the Office Action of August 21, 2007, Claims 2 and 23-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kropf et al. (US 6,368,577 B1) in view of Shui et al. (*Experimental Eye Research*, December 2000, Vol. 71 (6), pp. 609-618).

The Examiner argues that “Kropf et al. teaches a composition used for blocking the penetration of UV radiation comprising inorganic light-blocking pigments... such as cerium oxide.” Applicants’ amended Claim 27 is now limited to a method for increasing the survivability of living cells using cerium oxide as a regenerative, free-radical scavenger **in the body**. The Examiner admits that Kropf et al. teaches that the compositions in USP 6,368,577 are suitable for topical sunscreen application. In contrast, Applicants’ compositions are suitable for direct application to living cells **in the body** (rejuvenating cells, healing wounds and the like). The Examiner also admits that Kropf et al. does not teach a method of enhancing the longevity of cultured living cells, nor does Kropf et al. teach properties/function and structure of cerium oxide particles, nor the single application. Applicants claim and teach all of the above properties, functions and structural features not known or taught by Kropf alone or in combination with Shui et al. *supra*.

With regard to Shui et al., the Examiner argues that “Shui et al. teaches the morphological observation on cell death and phagocytosis induced by ultraviolet irradiation in cultured human lens epithelial cells.” Applicants’ arguments presented in the Amendment of June 12, 2007 were misunderstood. Shui et al. teaches that UV irradiation is a cause of cell death (apoptosis and/or necrosis); whereas, Applicants’ invention teaches how to keep living cells alive by preventing free radical induced damage with a regenerative cerium oxide free radical scavenger. Shui et al. never mentions cerium oxide; Shui et al. only teach that

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UV radiation is a cause of cell death. Applicant is teaching how to heal, increase survivability of living cells inside the body. Arguably, Shui et al. is not a relevant reference to Applicants' invention. So what, if UV irradiation causes cell death? Applicants have a method for keeping cells alive, healing injuries and extending cell life.

The Examiner admits that "Kropf et al. does not teach a method of enhancing the longevity of cultured living cells;" neither does Shui et al. teach a method for enhancing longevity. We find the Examiner's hindsight arguments untenable that "...it would be obvious to add a known UV protectant ...to help prevent UV from affecting the cell." because the Examiner has assumed that Applicants are using the cerium oxide as a topical UV protectant, not as a material that is administered to living cells **in the body** as a regenerative free-radical scavenger to heal, increase survivability and extend cell life.

There must be a reason apparent at the time the invention was made to the person of ordinary skill in the art for applying the teaching at hand, or use of the teaching as evidence of obviousness will entail prohibited hindsight." *In re Nomiya*, 184 USPQ 607 (CCPA, 1975).

Applicants also take exception to the Examiner's conclusory argument on page 4 of the Office Action of March 20, 2007, "...one would be motivated to combine the non-agglomerated ultrafine engineered nanoparticles of cerium oxide to protect the cultured cells from apoptosis or/and necrosis, hence enhancing the longevity." Again there is an impermissible assumption that a topical application to prevent UV cell death (the combined teachings of Kropf et al. and Shui et al.) would affect anything inside the body.

There is no teaching, suggestion or motivation provided by Kropf et al. (US 6,368,577 B1) in view of Shui et al. (*Experimental Eye Research*, December 2000, Vol. 71

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(6), pp. 609-618) that cerium oxide nanoparticles would function as regenerative free radical scavengers when added to living cells **in the body** and enhance the longevity thereof.

Applicants acknowledge the Examiner's response to Applicants' arguments filed June 12, 2007 on pages 5 – 7 of the Office Action of August 21, 2007.

In view of Applicants' amendments and cancellation of claims, it is respectfully requested that the Examiner find the rejection of claims 2, 23-26 to be moot because they are canceled. Applicants respectfully request that the withdrawal of the rejection of Claim 27 under 35 U.S.C. 103(a) based on the teachings of Kropf et al. (US 6,368,577 B1) in view of Shui et al. (Experimental Eye Research, December 2000, Vol. 71 (6), pp. 609-618) based on the amendments and arguments presented.


Amended 27 and new claims 28-33 are now pending. The application and claims are believed in condition for allowance in view of the amendments and arguments; allowance is respectfully requested.

If the Examiner believes that an interview would be helpful, the Examiner is requested to contact the attorney at the below listed number.

Respectfully submitted,

Date: 10/8/07

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